Inspections

In addition to professional preventive maintenance on a potentially CO-producing appliance, timely inspections should be performed by the occupant to identify signs of possible CO problems. Look for the following conditions, and if detected, have a professional service technician fully examine the unit for safe operation and continued use.

- ☞ Rusting or water streaking on the vent or chimney
- ☞ Loose or missing furnace panel
- ☞ Debris or soot falling from chimney, fireplace, or appliance
- ☞ Loose masonry on chimney
- ☞ Backflash of the flame out of the unit

In addition, there are signs that might indicate improper appliance operation which include:

- ☞ Decreasing hot water supply
- ☞ Furnace unable to heat house or runs constantly
- ☞ Sooting, especially on appliances
- ☞ Unfamiliar or burning odor
- ☞ Increased condensation inside windows

Carbon Monoxide Alarms

Proper appliance installation and maintenance are the most critical factors in preventing carbon monoxide poisonings. Carbon monoxide alarms can be used in certain situations as a safeguard should all else fail.

The Department supplies CO alarms to posts that have residences with certain combustion appliances. The alarms are listed by Underwriters Laboratories (UL) and are designed to minimize nuisance alarms from low and non-hazardous concentrations of carbon monoxide. They will alarm before hazardous levels accumulate in the area. If an alarm sounds, residents must summon help from the local fire service or post personnel and go to a location with fresh air outside the building. Reoccupancy should not occur until all combustion appliances have been checked for proper operation by a qualified service person.

How do CO alarms work?

A CO alarm activates because it detects a potentially dangerous concentration of CO. Different brands of detectors are designed with different options and features. Carefully read the product instructions, and understand what an alarm signal indicates and what actions you should take.

Domestic readers should purchase only Underwriters Laboratories (UL) Listed alarms manufactured after October 1, 1998. These units are less likely to cause a nuisance alarm from low concentrations of carbon monoxide.

Where should the alarm be installed?

CO distributes evenly and fairly quickly throughout the house; therefore, a CO alarm should not be installed in sleeping areas, but in the hallway leading to the bedrooms in order to alert *all* occupants who are sleeping in that part of the house. If bedrooms are located on multiple floors or different areas in a residence, then additional alarms will be needed.

A UL Listed alarm will sound before dangerous levels of CO accumulate. Do not place the alarm in damp humid areas or in areas where the temperature is below 40ºF (4.4ºC) or hotter than 100ºF (37.8ºC). Walls are acceptable locations for mounting CO detectors, but always read and follow the manufacturer's installation instructions. If you have an AC powered alarm you should test it monthly. If your unit is battery operated, test the detector weekly and replace the batteries at least once a year. Alarms provided to posts are battery operated.

Aren't there problems with alarms?

For various reasons, there have been some problems in the past with the use of CO alarms. Some problems were due to the alarms themselves, others to ambient air pollution or improper use and placement of the alarms.

Avoid placing a CO alarm directly on top of or across from a fuel-burning appliance. Appliances may emit some CO when initially started.

Underwriters Laboratories responded to early concerns about nuisance alarms by revising their standard governing CO alarms (UL 2034). New UL Listed CO alarms manufactured after October 1, 1998 were required to meet the revised standard in order to bear the UL mark. These detectors will ignore low levels of CO for a much longer period of time and will be equipped with reset buttons to help confirm life-threatening CO problems.

Never ignore the alarm. If you experience nuisance alarms, have a qualified technician come to your home and carefully inspect for sources of CO from all fuel-burning appliances, including gas heating systems, gas stoves, and fireplaces.

Who can I contact for information?

For additional information you should contact the Post Occupational Safety and Health Officer (POSHO).

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United States Department of State
Office of Safety, Health and Environmental Management

Carbon Monoxide

Hazards in Department Residences

What is carbon monoxide?

Carbon monoxide, or CO, is a colorless, odorless, toxic gas. It is produced by the incomplete combustion of solid, liquid, and gaseous fuels. Appliances fueled with gas, oil, kerosene, or wood may produce CO. If such appliances are not installed, maintained, and used properly, CO may accumulate to dangerous concentrations.

Where does CO come from?

Carbon monoxide is produced by devices that burn fuel. Therefore, any fuel-burning appliance in your home is a potential CO source. Electrical heaters and electric water heaters do not produce CO. Under normal circumstances, CO should not be detectable in the typical home or workplace.

When appliances are kept in good working condition, they produce little CO. But improperly operating or improperly vented appliances can produce elevated, even fatal, CO concentrations in your home. Likewise, using kerosene heaters or charcoal grills indoors, or running a car in a garage, can cause concentrations high enough to result in CO poisoning.

Common sources of CO include the following combustion appliances:

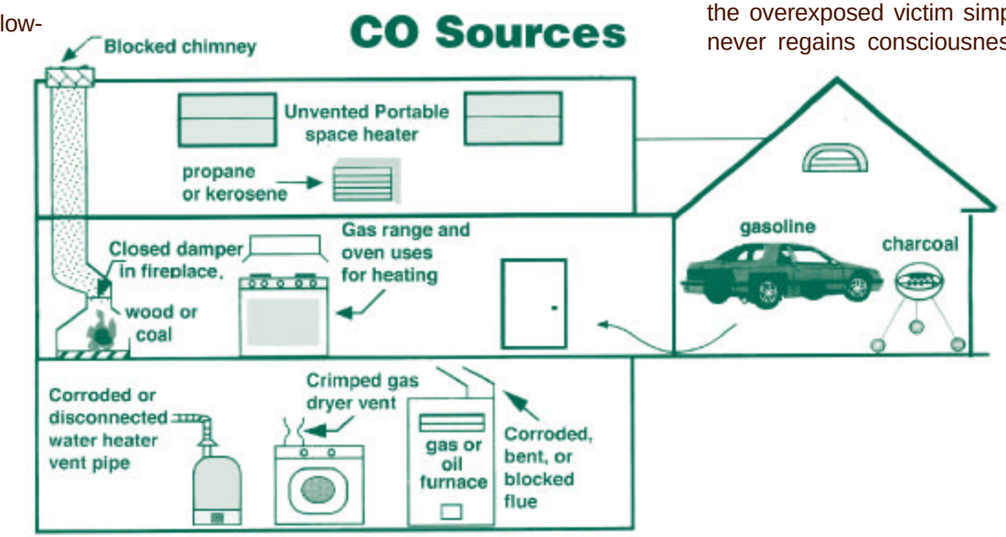
- Room heaters
- Furnaces
- Water heaters
- Charcoal and gas barbecue grills
- Automobiles run in closed garages
- Fireplaces
- Portable generators
- Wood burning stoves
- Cooking ranges

Who is at risk of CO poisoning?

Any person in space with a device capable of generating CO could potentially suffer from CO poisoning. CO exposures especially affect unborn babies, infants, and people with anemia or a history of heart disease. Breathing low levels of CO can cause fatigue and increase chest pain in people with chronic heart disease.

Each year, nearly 15,000 people in the United States are treated in hospital emergency rooms for CO poisoning; however, this number is believed to be an underestimate. Many people with CO symptoms mistake them for the flu or are misdiagnosed by physicians. Every year there are about 220 deaths from CO poisoning in the United States. Most of the carbon monoxide fatalities (75%) are from gas heating systems. This includes heating systems which use natural gas and propane. Fewer fatalities are caused by gas hot water heaters (5%) and kerosene or oil fired heating systems (5%).

CO hazards are greater in overseas residences than in housing found in the United States. This is due to inadequate building codes, poor installation work and other factors. Contrary to U.S. experience, gas water heaters represent the main CO hazard in Department residences.



Why is CO the silent killer?

Because CO has no warning properties, it is considered a silent killer. Heating systems and unvented, gas-fired instantaneous water heaters have caused fatalities in Department owned or leased residences. These water heaters operate only when hot water is used and many are found in bathrooms and kitchens. When an unvented unit is operated in a small area such as a bathroom, it can generate life-threatening concentrations of carbon monoxide in only 15–20 minutes.

Although not always experienced, the initial symptoms of CO are similar to the flu (but without the fever). They include:

- Dizziness
- Fatigue
- Headache
- Nausea

Longer term injuries are possible as a result of severe carbon monoxide poisoning. These injuries may involve seizures, memory loss, visual impairment, personality changes, disorientation, and many other symptoms. Victims who lose consciousness are more likely to suffer from these types of problems.

It is *critical* to note that death from CO poisoning can result with some or all of these symptoms never being experienced, in which case the overexposed victim simply "falls asleep" and never regains consciousness.

How can I prevent CO poisoning?

Dangerous levels of CO can be prevented by proper appliance maintenance, installation, and use. To avoid CO poisoning, follow these tips:

Installation:

- Proper installation is critical to the safe operation of combustion appliances. All new appliances have installation instructions that should be followed exactly.
- Appliances such as hot water heaters, furnaces, etc. should be vented properly, according to the manufacturer's instructions.
- Adequate combustion air should be provided to ensure complete combustion.
- All combustion appliances should be installed by professionals.

Maintenance:

- A qualified service technician should perform annual preventive maintenance in homes with central and room heating appliances.
- Chimneys and flues should be kept free of blockages, corrosion, and loose connections. Annual cleaning should be required for oil fired appliances and for other appliances depending upon the type of fuel used.
- Kerosene and gas space heaters should be cleaned and maintained, according to the manufacturer's instructions.

Appliance Use:

- Know the location of all combustion appliances in your residence.
- Follow the manufacturer's directions for safe operation. Be sure to have appliance manuals in English and the host country language.
- Learn how to safely shut down appliances in case of emergency.
- Never use an unvented space heater.
- Never use charcoal or gas barbecue grills inside a home, tent, camper, or unventilated garage.
- Don't leave vehicles running in an enclosed garage, even to "warm up" on a cold morning.